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IS 9175-27 (1987): Rationalized Steels for Automobile and Ancillary Industry, Mechanical and Physical Properties - Part 27 15Ni7Cr4MO2 Grade steel [MTD 16: Alloy Steels and Forgings]

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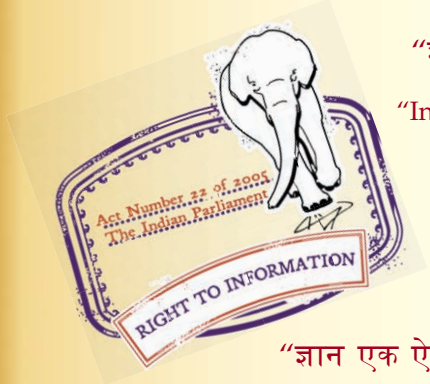

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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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SPECIFICATION FOR RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 27 MECHANICAL AND PHYSICAL PROPERTIES OF 15Ni7Cr4Mo2 GRADE STEEL

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SPECIFICATON FOR RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 27 MECHANICAL AND PHYSICAL PROPERTIES OF 15Ni7Cr4Mo2 GRADE STEEL

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Indian Standard

SPECIFICATION FOR RATIONALIZED STEELS FOR THE AUTOMOBILE AND ANCILLARY INDUSTRY

PART 27 MECHANICAL AND PHYSICAL PROPERTIES OF 15Ni7Cr4Mo2 GRADE STEEL

0. FOREWORD

0.1 This Indian Standard (Part 27) was adopted by the Indian Standards Institution on 15 January 1987, after the draft finalized by the Co-ordinating Committee on Materials for Automobiles had been approved by the Structural and Metals Division Council.

0.2 Part 1 of this Standard was published in 1979 which covers the chemical composition of 33 rationalized steels. The mechanical properties, hardenability and isothermal transformation characteristics of these 33 rationalized steels are being covered in different parts of this standard (Parts 2 to 34). The data concerning these properties, given in this standard, is only for guidance and information purposes.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part 27) covers the chemical composition, mechanical properties and hardenability of 15Ni7Cr4Mo2 grade of steel for use by automobile and ancillary industry.

*Rules for rounding off numerical values (*revised*).

2. CHEMICAL COMPOSITION

2.1 The chemical composition of this grade of steel shall be as given below:

Constituents, Percent

C	Si	Mn	Ni	Cr	Mo	S	P
0·12-0·18	0·15-0·35	0·60-1·00	1·50-2·00	0·75-1·25	0·10-0·20	0·035 *Max*	0·035 *Max*

3. HARDNESS

3.1 The maximum hardness for this grade of steel delivered in the annealed condition when determined in accordance with IS : 1500-1983* shall be 248 HB.

4. MECHANICAL PROPERTIES

4.1 The mechanical properties of this grade of steel in the blank carburized and hardened condition, when determined in accordance with IS : 1598-1977† and IS : 1608-1972‡, shall be as given below:

a) Tensile strength, MPa, *Min*	1 080
b) Elongation, percent, *Min* (gauge length $5{\cdot}65\sqrt{So}$)	9
c) Izod impact value, Joules, *Min*	27
d) Limiting ruling section, mm	30

5. HOT WORKING AND HEAT TREATMENT TEMPERATURES

5.1 The recommended hot working and heat treatment temperatures shall be as given below:

Forging/rolling temperature	1 200°C
Process annealing temperature	650-700°C
Carburizing temperature	880-920°C
Refining temperature	850-880°C
Hardening temperature	780-820°C
Tempering temperature	200°C *Max*

6. HARDENABILITY

6.1 The end quench hardenability band is given in Fig. 1.

*Method for Brinell hardness test for matallic materials (*second revision*).

†Method for izod impact test of metals (*first revision*).

‡Method for tensile testing of steel products (*first revision*).

7. EFFECT OF TEMPERING ON CASE HARDNESS

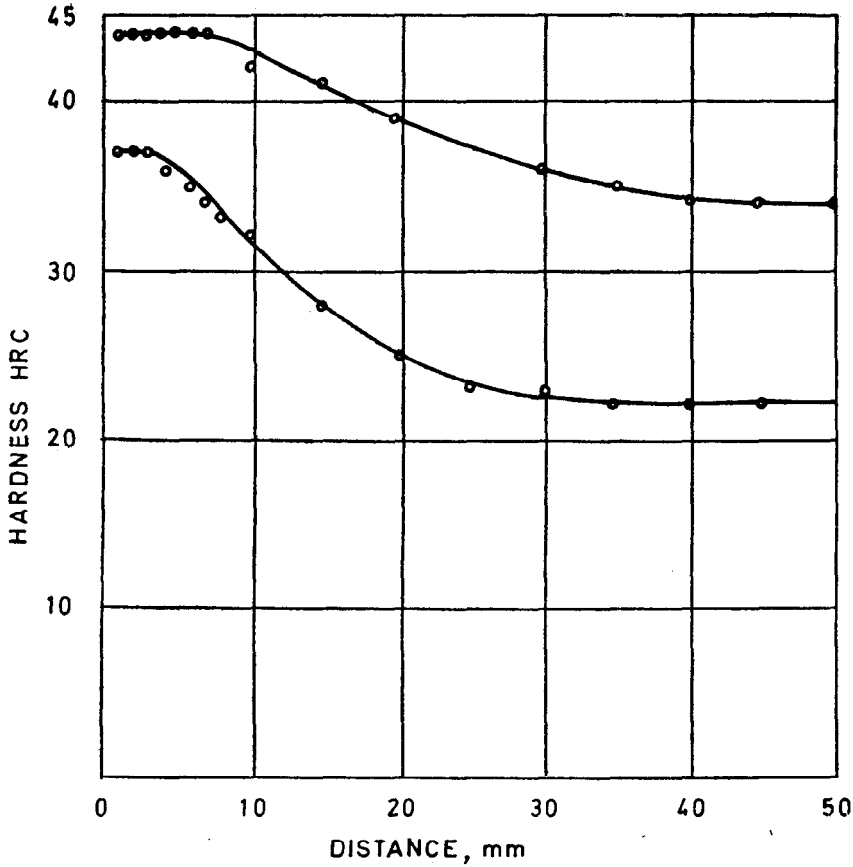
7.1 The curve showing the effect of tempering on case hardness is given in Fig. 2.

8. EFFECT OF SECTION SIZE ON MECHANICAL PROPERTIES

8.1 The curves for the effect of section size on mechanical properties is given in Fig. 3.

9. MACHINABILITY

9.1 In the softened condition the machinability of this grade of steel is approximately 70 percent of that for mild steel.



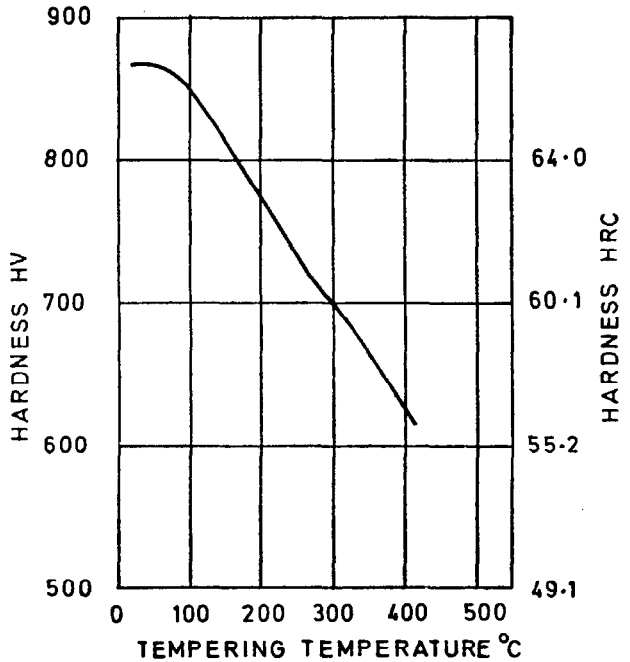
Chemical Composition, Percent

C	Si	Mn	Vi	Cr	Mo
0·14—0·20	0·10—0·35	0·60—0·90	1·30—2·00	0·80—1·20	0·10—0·20

Grain Size 5 to 8

Distance in mm	1	2	3	4	5	6	7	8	9	10	15	20	25	30	35	40	45	50
Max (HRC)	44	44	44	44	44	44	44	43	43	43	41	39	37	36	35	35	34	34
Min (HRC)	37	37	37	36	35	35	34	33	33	32	28	25	23	23	22	22	22	22

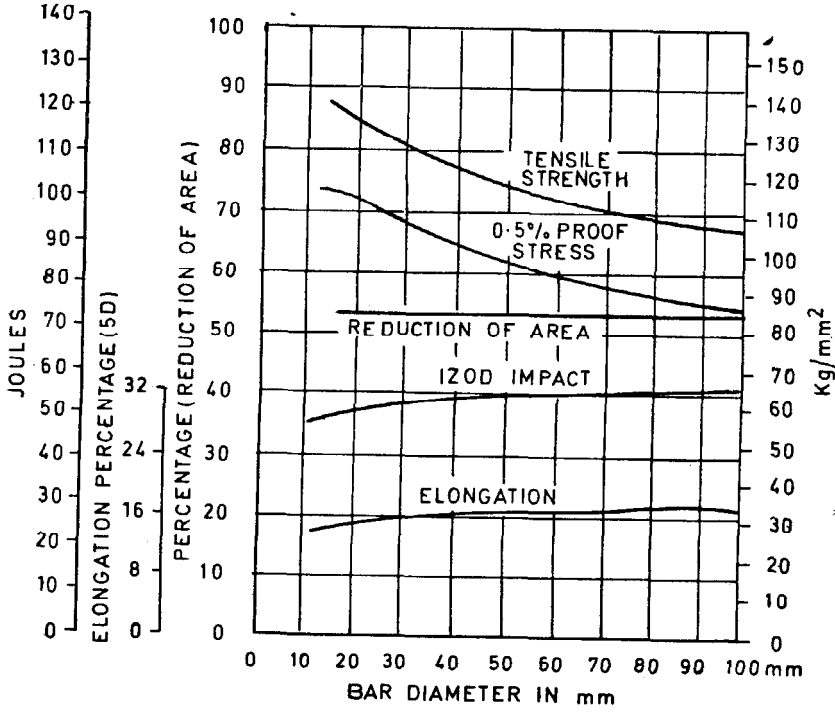
FIG. 1 END QUENCH HARDENABILITY BAND OF 15Ni7Cr4Mo2 GRADE STEEL



Typical Curve

Carb urized 900°C
Oil refined 860°C
Oil hardness 800°C
Tempered as indicated

FIG. 2 EFFECT OF TEMPERING ON CASE HARDNESS OF 15Ni7Cr4Mo2 GRADE STEEL



Typical Curves

Blank carburized 900°C
Oil refined 860°C
Oil hardened 800°C

FIG. 3 CURVES SHOWING EFFECT OF SECTION SIZE MECHANICAL PROPERTIES (OF CORE) OF 15Ni7Cr4Mo2 GRADE STEEL

(*Continued from page* 2)

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg,m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s(s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2